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On invariant Graph subspaces

Abstract

For unbounded 2×2 block operator matrices $B = \begin{pmatrix} A_0 & W_1 \\ W_0 & A_1 \end{pmatrix}$ we investigate the relation between pairs of reducing graph subspaces, solutions to the Riccati equation

$$A_1 X - X A_0 - X W_1 X + W_0 = 0$$

and block diagonalization of the operator B .

Under mild additional assumptions, we show that such a pair of subspaces decomposes the operator matrix if and only if its domain is invariant for the angular operators associated with the graphs. As a byproduct of our considerations, we suggest a new block diagonalization procedure that resolves related domain issues. In the case when only a single invariant graph subspace is available, we obtain block triangular representations for the operator matrix B .

As an application, we provide a way for block diagonalization of a massless two dimensional graphene Hamiltonian.

This talk is based on joint work with K. A. Makarov and A. Seelmann.

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Talk location: Crow 204

Special Session: Applied harmonic analysis, frame theory, and operator theory. Organized by G. Kutyniok.